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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/075,193	02/13/2002	Shenlin Chen	MI22-1927	8017

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EXAMINER	
HUYNH, YENNHU B	

ART UNIT	PAPER NUMBER
2813	

DATE MAILED: 11/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/075,193		
	Examiner	Art Unit	
	Yennhu B Huynh	2813	MW

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 August 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *42-48* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *42-48* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *14*.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/27/03 has been entered.

Information Disclosure Statement

The information disclosure statement is being considered by the examiner.

Specification

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 42-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Al-Brown (U.S. 5418,180) in view of Figura et al. (U.S. 5,661,064) and DeBoer et al. (U.S. 6,046,093).

Brown at figs. 1-8 in related text col. 1-8 discloses a process for fabricating storage capacitor structure, which include:

-Re. claim 42: forming a container structure (fig.21) comprising a multiple silicon containing layer of first silicon containing layer 31, center silicon containing layer 32 & last silicon containing layer 41 (fig. 4, col.6 lines 6-8); the last silicon containing layer defining and inner periphery of the container and the first silicon containing layer defining an outer periphery of the container; wherein the first silicon containing layer 31 being doped with conductive enhancing n type dopant such as arsenic, phosphorous or boron (col. 4, lines 3-8); converting at least some of each of the first and last silicon containing layers to HSG silicon (fig. 7a, col. 4 & 5 lines 61-15); forming a dielectric material layer 81 along the exposed inner and exposed outer peripheries of the container construction; forming a conductive material layer 82 over the dielectric material, the container structure and conductive material together defining capacitor structure (fig.8, col.6, lines 6-28).

However, Brown does not disclose wherein the first silicon containing layer being more heavily doped than the second (last) silicon-containing layer.

Figura et al. at figs. 1-10 in related text col. 1-12 disclose a method of forming a capacitor having container member, which include wherein the first silicon containing layer 20 or 28 being less heavily doped than the second silicon containing layer 24 or

32 of the container 34 or 35 (col. 3 lines 26-68). However, Figura et al. also disclose the heavily doped and lightly doped layers between the first and second silicon containing layer 20,24,28 & 32 can be reversed (col.5 lines 1-16).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Brown invention by incorporation the first silicon containing layer being heavily doped than the second (last) silicon containing layer, because the first silicon layer is defined as an outer periphery of the capacitor container, which function as a part of capacitor electrode, therefore, the that heavily doped first silicon layer will provide high electrically conductive for electrical connection to transistor gate or incorporation into DRAM cell.

Brown also do not disclose wherein the HSG silicon from the first silicon containing layer /outer periphery of the container having smaller average grain size than the HSG silicon from the last (or second) silicon containing layer/inner periphery of the container.

Deboer et al. at figs. 11-15 in related text col. 1-14 disclose a method of forming capacitors, which include the HSG silicon layer having larger average grain size if the HSG formed over the inner surface of capacitor container structure (col.6, lines 53-68).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Brown invention by incorporation HSG silicon from the first silicon containing layer/outer periphery of the container having smaller average grain size than the last silicon containing layer/inner periphery of the container, to void a risk of shorting between the container and other structures when the outer surface is

small size grain or smooth, and to increase the surface area of electrodes, when the inner surface is large grain size, in related association to those which would occur without rugged inner surface were utilized.

Brown also disclose:

-Re. claim 48: wherein the last (or second) silicon-containing layer is substantially undoped (col.7, cls. 21 & 24).

Brown, Figura et al. and DeBoer et al. disclose substantially all of the claimed invention. However, they do not disclose wherein exposing the first and second (last) silicon containing layer in a range of temperature at least about 550° for a time less or equal to about 2 minutes, and less than or equal to about $1x10^{-4}$ Torr to seed the silicon containing layers (cl.43), and an average dopant concentration to the first and second (last) silicon layer (cls. 44-47).

-Re. claim 43: DeBower et al. discloses only wherein the silicon-containing layers are annealed at a temperature, which is from 450°C to 560°C (col.5, lines 55-65).

With respect to claims 43-47 the range of time, pressure and concentration dopant are considered to involve routine optimization while has been held to be within the level of ordinary skill in the art, as noted In re Aller 105 USPQ233, 255 (CCPA 1955). the selection of reaction parameters such as temperature and concentration would have been obvious.

"Normally, it is to expected that a change in temperature, or in range, concentration, cycles, thickness, would be an unpatentable modification. Under some circumstance, however, changes such as these may be impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art ... such ranges are termed "critical ranges and the applicant has the burden of proving such criticality ... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller 105 USPQ233, 255 (CCPA 1955). See also In re Waite 77 USPQ 586 (CCPA 1948); In re Scherl 70 USPQ 204 (CCPA 1946); In re Irmscher 66 USPQ 314 (CCPA 1945); In re Norman 66 USPQ 308 USPQ 308 (CCPA 1945); In re Swenson 56 USPQ 372 (CPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yennhu Huynh whose telephone number is (703) 308-6110. The examiner can normally be reached on Monday-Friday from 8:00 AM to 4.30PM.

If attempts to reach the examiner by telephone are unsuccessfully, the Examiner's supervisor, Carl Whitehead, Jr., can be reached on (703) 308-4940. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-3432.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Yennhu Huynh,
Examiner
11/12/03